PATENT CLAIMS

1. Transponder for amplification of a received signal (60) into a receiving element (1), e.g. an antenna, to a signal (61) for retransmission, where the retransmission signal (61) possible can have information superimposed, c h a r a c t e r i z e d in that the transponder comprises, as an amplifying element, a quenched oscillator (5).

2. Transponder according to claim 1, c h a r a c t e r i z e d in that the oscillator (5) is a superregenerative oscillator.

3. Transponder according to claim 1, c h a r a c t e r i z e d in that the oscillator (5) exhibits negative resistance (30) for the received signal (60).

4. Transponder according to claim 1, c h a r a c t e r i z e d in that the oscillator (5) is connected to a quench switch (7) arranged for coupling a quench signal (31) into the oscillator.

5. Transponder according to claim 1, c h a r a c t e r i z e d in that the oscillator (5) is operative to deliver the retransmission signal (61) onto the same signal path (2, 3, 4) as the path followed by the received signal (60) from the receiving element (1), which signal path (2, 3, 4) thus is bi-directional.

6. Transponder according to claim 1, c h a r a c t e r i z e d in that the oscillator (5) comprises a resonator element of any type, but with a Q factor suitable to give the retransmission signal (61) large to very large amplification.

7. Transponder according to claim 4, c h a r a c t e r i z e d in that the quench switch (7) is arranged to switch a bias voltage (6) to the oscillator (5).

8. Transponder according to claim 4,
c h a r a c t e r i z e d in that the quench switch (7) is operative to switch in and out an impedance that the oscillator (5) sees.

9. Transponder according to claim 4,
c h a r a c t e r i z e d by a modulator (17) which controls the quench switch (7) with a switching signal (32).

10. Transponder according to claim 5,
c h a r a c t e r i z e d in that the bi-directional signal path (2, 3, 4) between the antenna (1) and the oscillator (5) has additionally a band pass filter (3) included.

11. Transponder according to claim 9,
c h a r a c t e r i z e d in that the modulator (17) is operative to receive a modulator signal (63), which may be a information carrying signal, and to produce the switching signal (32) as a function of the modulator signal (63) whereby the quench signal (31) leads to superimposing of a modulation signal on the retransmission signal (61).

12. Transponder according to claim 9,
c h a r a c t e r i z e d in that the oscillator (5) is connected to an additional modulator (87) for submission of an information signal (38) to the oscillator (5) independently of the quench switch (7) and the firstly mentioned modulator (17), said information signal (38) being generated by the additional modulator (87) on the basis of an additional modulation signal (63) which contains the information.

13. Transponder according to claim 12,
c h a r a c t e r i z e d in that the switching signal (32) is a predetermined frequency that is from higher to many times higher than the highest frequency component of the information signal (38).

14. Transponder according to claim 9,
c h a r a c t e r i z e d by the inclusion of at least one transmit-receive switch (14) connected to at least one of a bias arrangement (6) for the oscillator (5), a modula-

tor (17, 87) and a pulse forming network (9) for the switching signal (39, 32), for control of switching signal and bias voltage.

15. Transponder according to claim 10,
c h a r a c t e r i z e d by further having included a detector arrangement (11), like a Schottky diode, coupled high frequency-wise to the oscillator (5), preferably loosely coupled to the signal path (4) close to the oscillator (5), using a coupler (95), in such a way that the information carrying received signal (62) can be amplified by the oscillator (5) in order to increase the amplitude of a detected signal (33, 34) behind the detector arrangement (11).

16. Transponder according to claim 15,
c h a r a c t e r i z e d by the inclusion of an amplifier (12) connected following the detector (11), for amplification and possibly filtering of the detected signal (33) into an infosignal (36) of desired amplitude and dynamic properties.

17. Transponder according to claim 15,
c h a r a c t e r i z e d by the inclusion of a wake up circuit (13) connected following the detector (11), for utilisation of the detected signal (34) to produce a wake up signal (37).

18. Transponder according to claim 10,
c h a r a c t e r i z e d in that the band pass filter (3) in operative to filter out all side bands that result from the quench signal (31) frequency, to allow the retransmitted signal (61) to become a clean, amplified version of the received signal (60) thereby acheving an analogue relay link.

19. Transponder according to claim 10,
c h a r a c t e r i z e d in that the band pass filter (3) is bi-directionally divided and encompasses two directional filters, in order to achieve a retransmission signal with frequency shift.

20. Transponder according to claim 9 and 10,
c h a r a c t e r i z e d by integrating at least two of the transponder elements hereby stated: receiving element (1), band pass filter (3), futher signal path (2, 4), oscillator (5), quench switch (7) and modulator (17).

21. Transponder according to claim 1,
c h a r a c t e r i z e d by being implemented as a customer specified, integrated circuit (ASIC, 651) with analogue circuits (120).

22. Transponder according to claim 21,
c h a r a c t e r i z e d in that the ASIC circuit (651) also incorporates digital modules (125, 135).

23. Transponder according to claim 21,
c h a r a c t e r i z e d by the ASIC circuit incorporating a duplex transceiver with or without frequency transposing.

24. Transponder according to claim 1,
c h a r a c t e r i z e d in that it is implemented as a microwave integrated circuit (MMIC, 651) using analogue circuits (120).

25. Transponder according to claim 1,
c h a r a c t e r i z e d in that the receiving element (1) is implemented as a coupling or probe to a transmission medium like a transmission line.

26. Transponder according to claim 1,
c h a r a c t e r i z e d in that the oscillator (5) is operative as a two port with an input and an output where the input is a signal sensitive point in the oscillator like a transistor base, gate, source or emitter, while the output is a point where highest possible energy level may be collected, like a transistor collector, drain, emitter or source.

27. Transponder according to claim 26,
c h a r a c t e r i z e d in that the twoport being coupled to an arrangement for directional attenuation, to utilize the total dynamic range of the transponder.

28. Transponder according to claim 26,
c h a r a c t e r i z e d in that the twoport is coupled to separate receiving elements and transmission elements.

29. Transponder according to claim 1,
c h a r a c t e r i z e d by a filter arranged to reduce harmonic overtones from the oscillator (5) quench frequency in the frequency range where the transponder sensitivity is largest, which filter is part of the oscillator or is a part (8) of a separate circuit connected to the oscillator (5).

30. Transponder according to claim 1,
c h a r a c t e r i z e d by an arrangement (87) for introducing secondary quenching as oscillations superimposed on the primary quench oscillation, at a point in the oscillator (5) where the oscillating conditions can be influenced.

31. Transponder according to claim 1,
c h a r a c t e r i z e d by a function generator (9) for asymmetrical control of the quench oscillation.

32. Use of at least one transponder in accordance with claim 1, in a wireless or wire-based network, the receiving elements (1) of the transponders being implemented as couplings or probes (141, 142, 143, 223) to network transmission mediums (92, 400, 460) like for instance transmission lines (410, 460).

33. Transponder system for wireless and wire-based networks, comprising a number of transponders (19, 601, 606, 213, 219) for amplification of a received signal (60) into a receiving element (1, 141, 143, 200, 220, 223), for instance an antenna or a probe, to a signal (61) for retransmission, where the retransmitted signal (61) may have information superimposed, whereby the transponders can

work as intelligent or unintelligent connections in a network based on transmission through at least one of a number of possible transmission media (92, 400, 460), characterized in that each transponder comprises, as amplifying element, a quenched oscillator (5, 355).

34. Transponder system according to claim 33, characterized in that at least one of the oscillators (5, 355) is of the super-regenerative type.

35. Transponder system according to claim 33, characterized in that at least one of the transponders is a multi-port transponder.

36. Transponder system according to claim 33, characterized in that at least one of the transponders is operative to receive a quench signal from a dedicated quench generator (210).

37. Transponder system according to claim 33, characterized in that at least two of the transponders are operative to receive a quench signal from a common quench generator (210).

38. Transponder system according to claim 33, characterized in that at least two of the transponders are operative to receive a control signal for synchronisation of own quench generator (210)

39. Transponder system according to claim 33, characterized in that at least one transponder is coupled to the network with the help of only one coupling element, which coupling element is identical to the receiving element.

40. Transponder system according to claim 39, characterized in that the coupling element is an antenna or a probe in vacuum, gas or matter.

41. Transponder system according to claim 39,
c h a r a c t e r i z e d in that the coupling element is made up of a loose coupling to a line, in the form of an inductive, capacitive or resistive coupling, possibly a combination thereof.

42. Transponder system according to claim 35,
c h a r a c t e r i z e d in that at least one transponder is coupled to the network using two coupling elements, of which one is the receiving element connected to a first port of the transponder, and the second is a transmission element tied to a second port of the transponder.

43. Transponder system according to claim 42,
c h a r a c t e r i z e d in that at least one of the coupling elements is comprised of an antenna in vacuum, gas or matter, a probe in vacuum, gas or matter and a loose coupling to a line, in the form of an inductive, capacitive or resistive coupling, potentially a combination of these.

44. Transponder system according to claim 33,
c h a r a c t e r i z e d in that at least two oscillators or transponders are arranged inter-coupled, with common quenching, or synchronised quenching with controlled phase shifting between different quench signals, to achieve a long active cycle (duty cycle) for the transponder circuit.

45. Transponder system according to claim 33,
c h a r a c t e r i z e d by being incorporated in a wireless or wire-based network based on at least one type of spread spectrum technology.

46. Transponder system according to claim 33,
c h a r a c t e r i z e d in that the wireless or wire-based network that encompasses the transponder system, is based on transfer protocols in accordance with, or based on at least one of the communication systems UMTS, GSM, GPRS, TETRA, Ethernet including Long Range Ethernet, Bluetooth, wireless LAN, satellite access return channels, DOCSIS, EURODOCSIS and other cable modem protocols.

47. Transponder system according to claim 33, characterized in that at least one of the transponders is powered via an inductive, capacitive or resistive coupling or a combination of these coupling types, from the transmission medium (410, 460) in question.

48. Transponder system according to claim 33, characterized in that the oscillator (5) is a quenched oscillator exhibiting CW oscillation.

49. Use of a transponder system according to claim 33, in an asymmetrical communication system, <u>as</u> cable modems, whereby the communication system may use transmission medias other than coaxial cables.

50. Use of at least one transponder according to claim 1, <u>in</u> a radio positioning scenario using any type of positioning principle, in order to, with the aid of the transponder (19, 219), establish any geometrical place in the positioning scenario.

51. Transponder according to claim 1, characterized in that a bi-directional frequency converter (750) is arranged to provide equal and opposite phase shift in between incoming respectively outgoing signal port (751) and the oscillator (18, 19, 5, 601-606).

52. Transponder according to claim 51, characterized in that said frequency converter (750) is a single diode mixer, for instance a Schottky diode.

53. Transponder according to claim 51, characterized in that a bandpass filter (753) is arranged in series with said converter (750).

54. Transponder according to claim 1, characterized in that a series connection of an input filter (871), a frequency converter (752) and an output filter (872) is connected between an input

terminal (825) and said oscillator (860), an output from said oscillator being tied to the input terminal (825) thereby to provide a frequency transposing one-port amplifier.

55. Transponder system according to claim 33, characterized in that the transponders (830, 831, 832; 840, 841, 842) contain bi-directional frequency converters (750) or one-port bi-directional amplifier systems (825, 871, 752, 872, 860).

56. Transponder system according to claim 33, characterized in that the transponders (910, 920; 911, 921) are inserted between directional couplers (950, 951) in an asymmetrical communication system, providing selective frequency transpositioning by means of frequency converters (910, 911).

57. Transponder system according to claim 33, characterized by at least one combiner (1130) for cancelling radiated signals and noise pick up from signals received from said at least one transmission medium (1101), said combiner (1130) being connected to receive signals (1105) and noise from said transmission medium (1101) via a transponder coupling (1110), and to receive radiated signals (1050) and noise (1051) via an antenna or probe (1120).

58. Transponder system according to claim 57, characterized in that said combiner (1130) comprises an arrangement (1135) for adjusting phase and amplitude relationships between received signals.